

FORMATION OF TERBIUM(III) SINGLE-MOLECULE MAGNETS IN A RIGID HEXACYANIDOMETALLATE-BASED COORDINATION NETWORK

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Trivalent lanthanide ions stay now at the forefront in the field of molecular magnetism, especially when researchers aimed to construct highly magnetically anisotropic metal complexes, named single-molecule magnets (SMMs) [1]. Such molecular objects reveal the magnetic hysteresis loop originating from the property of a single molecule; thus, they are expected to revolutionize the techniques for high-density data storage. The SMMs, especially those based on lanthanide ions exhibiting attractive luminescence, are promising candidates for multifunctional molecules linking magnetic characteristics with other physical effects, e.g., optical or chiroptical ones.[2,3] Therefore, there is a continuous need for efficient strategies for high-performance lanthanide-based SMMs. Extraordinary results were found for the Dy(III)-based SMMs.[1] On the other hand, the other promising candidate of the Tb(III) center, which can combine extremely strong magnetic anisotropy with pronounced luminescence, was found to be much more difficult in the design and tuning of magnetic properties. We will present a few successful strategies providing high-performance Tb(III) SMMs and our work in this area. We realize the Tb-SMMs by placing this metal ion into the rigid heterometallic d-f cyanido-bridged network that undergoes the desolvation process producing the desired high symmetry Tb(III) complexes (Figure 1). We will discuss how the hexacyanido-metallate complexes, broadly applied in molecular magnetism, are used to induce the strong magnetic anisotropy and opto-magnetic multifunctionality of Tb³⁺ ions [4-6].

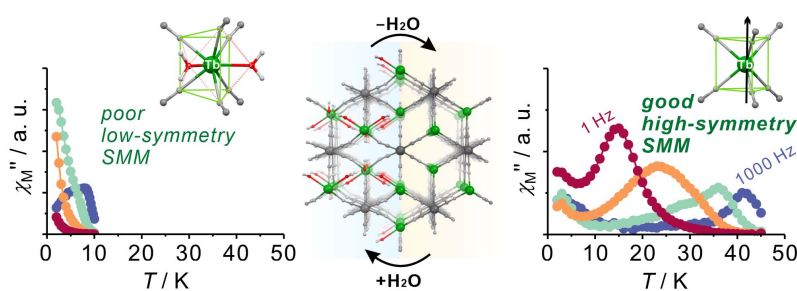


Figure 1. Magnetic characteristics and the structural features of the hydrated (left) and the desolvated (right) phases of the cyanido-bridged Tb^{III}-[Co^{III}(CN)₆]³⁻ framework.

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